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CALCULUS.

148. Proposed by **F. P. MATZ, Sc. D., Ph. D.**, Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

Hemholtz's differential equation for the strength of an electric current C at any time t, is $C=E/R-L/R\times dC/dt$. Solve this equation, supposing $C=0$ when $t=0$; and E, R, L are to be regarded as constants.

149. Proposed by **G. B. M. ZERR, A. M., Ph. D.**, Professor of Chemistry and Physics in The Temple College, Philadelphia, Pa.

Find the volume contained between the plane $z=(a-x)\cot\beta$ and the surface $xz^2=(a-x)(x^2+y^2)$.

MECHANICS.

138. Proposed by **W. J. GREENSTREET, M. A.**, Editor of The Mathematical Gazette, Stroud, Gloucestershire, England.

A smooth elliptical tube is held in the vertical plane with its major axis inclined to the vertical. A particle is projected from the lowest point. Find the pressure on the tube at any point and the condition that the pressure may vanish at the highest point.

139. Proposed by **F. P. MATZ, Sc. D., Ph. D.**, Professor of Mathematics and Astronomy in Defiance College, Defiance, O.

A homogeneous sphere, radius $r=50$ inches, makes $m=30$ revolutions around an axis every second. The mass begins to disappear from the surface into space at a rate exactly sufficient to cause the diameter to decrease uniformly at the rate of $(1/n)$th$=1/1000$th of a linear inch per second. At what rate per second is the angular velocity of the sphere changing the instant the diameter becomes $p=10$ inches? What is the diameter of the sphere when the rate of disappearance of matter is midway between minimum and maximum? When is the angular velocity a maximum? How does this maximum angular velocity compare with the original angular velocity? What is the diameter of the sphere when the paracentric force is (1) a maximum and (2) a minimum?

DIOPHANTINE ANALYSIS.

101. Proposed by **JOSIAH H. DRUMMOND, LL. D.**, Portland, Me.

If p and q are such values of x and y as fulfill the conditions $x^2\pm y^2-1=$a square, find, in terms of p and q, the expression for an indefinite number of other values.

102. Proposed by **A. H. BELL**, Hillsboro, Ill.

Prove that every indeterminate equation of the second degree can be reduced to $x^2-Ay^2=Bz^2$. [*Legendre.*]

AVERAGE AND PROBABILITY.

123. Proposed by **LON C. WALKER, A. M.**, Professor of Mathematics, Petaluma High School, Petaluma, Cal.

Three points are taken at random within a square. What is the probability that the triangle formed by joining them is acute?

124. Proposed by **F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.**

Find the average area of a spherical polygon of $n=6$ sides.

MISCELLANEOUS.

124. Proposed by **J. W. YOUNG, Graduate Student, Cornell University, Ithaca, N. Y.**

Prove that the general value of θ, which satisfies the equation

$$(\cos\theta+i\sin\theta)(\cos2\theta+i\sin2\theta)\ldots\text{to } n \text{ factors}=1 \text{ is } \frac{4m\pi}{n(n+1)};$$

where m is any integer $(i=\sqrt{-1})$.

125. Proposed by **F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.**

Assume $m=nt+\varepsilon-\omega$, thus giving $v=m+e\sin v$ as the relation connecting the mean and eccentric anomalies, then express $x=a\cos v$, $y=b\sin v$, and $r=a(1-e\cos v)$ by a Fourier series in terms of m.

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BOOKS AND PERIODICALS.

Graphs. By Robert J. Aley, A. M., Ph. D., Professor of Mathematics in the Indiana University. Pamphlet Form, 21 pages. Price, 10 cents. Boston and Chicago: D. C. Heath & Co.

This is No. 6 of Heath's Mathematical Monographs issued under the general editorship of Webster Wells, S. B., Professor of Mathematics in the Massachusetts Institute of Technology. In this monograph, Dr. Aley has pointed out the various uses that are being made of Graphs in almost every department of knowledge. In addition to plotting a temperature curve, four problems are solved by means of graphs, of which the first is the following: "A travels 4 miles an hour, B 6 miles an hour. If A has two hours the start, when and where will B overtake him?" Then comes the solution of Linear Equations in two variables, and following these, Simultaneous Quadratics, closing with the graphic representation of complex numbers.

College Algebra. By Leonard Eugene Dickson, Ph. D., Assistant Professor of Mathematics in the University of Chicago. First edition. First thousand. 8 vo. Cloth, vi+214 pages. Price, $1.50. New York: John Wiley & Sons.

"This text," the author tells us, "is intended primarily for college and technical schools. By treating only the subjects usually given in the college course in algebra, space has been gained for more detailed exposition of the more difficult topics." The work begins with a treatment of Number in Algebra; Surds and Imaginaries. Then follows in order the subjects Exponents—Logarithms; FactorTheorem—QuadraticEquations; Simultaneous Equations—Determinants; Ratio—Proportion, Variation, the Progressions, Compound Interest and Annuities; Undetermined Coefficients, Partial Fractions; Permutation and Combination, Binomial and Multinomial Theorem; Probability, Mathematical Induction, Limits, Indeterminate Forms; Convergency and Divergency of Series; Power Series and other series, Summation of Series, the Method of Differences, Graphic Algebra,